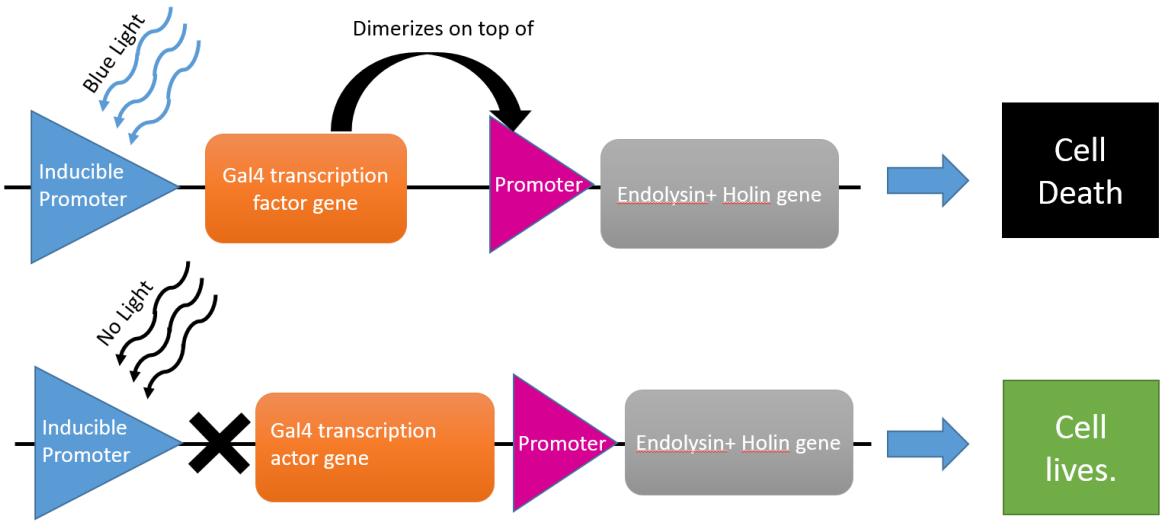
The first proposal is a kill-switch system based on the sensitivity of light. The device utilizes a blue-light induced promoter (Wang et al., 2012). Small photosensitive protein vivid (VVD) inside the cell has a domain termed Light-Oxygen-Voltage-sensing (LOV) domains which dimerize in the presence of blue light. The dimer then then binds to an inactive form Gal4 (65) of transcription factor Gal4 to form the active form Gal4. The active transcriptional factor then binds to the promoter and facilitate kill-switch gene transcription.

The kill-switch gene would be Endolysin+ Holin. They facilitate cleavage of the glycosidic bond between the C-1 of N-acetylmuramic acid (NAM) and the C-4 of N-acetylglucosamine (NAG) in the bacterial peptidoglycan (PG), leading to cell lysis (Elitok, 2012).



Pros: This kill-switch system has consumes minimal energy from cells encapsulated in the silica beads, a microenvironment that lacks nutritional input. With our light-proof encapsulation device, only cells that escape would activate this pathway.

Cons: Depending on the intensity of the light, the level of our kill-switch activation will most likely vary. This can potentially be a problem when remediating a reservoir with poor light permeability such as a muddy pond.

Elitok, M. (2012). Part:BBa K772101 - parts.igem.org.

Wang, X., Chen, X., and Yang, Y. (2012). Spatiotemporal control of gene expression by a light-switchable transgene system. Nat. Methods *9*, 266–269.